environments such as, but not limited to, ISO 5 clean room environments, narrow aisle-ways (e.g., less than 2 meters wide), under typical semiconductor fabrication facility conditions.

In one aspect of the present invention, there is provided a mobile robot for handling a job assignment in a physical environment inhabited by stationary and non-stationary obstacles, the mobile robot comprising: a) a robot base, comprising (i) a map defining a floor plan for the physical environment, a set of job locations in respect to the floor plan, and associating a set of one or more job operations with two or more job locations in the set of job locations; (ii) a robot base controller that receives the job assignment, the job assignment including a specified job location, the specified job location having an associated set of job operations, and (iii) an onboard navigation system; b) wherein, in response to receiving the job assignment, the onboard navigation system automatically (i) determines a floor plan location based on the specified job location and the map, the floor plan location representing an actual location in the physical environment, (ii) determines, in accordance with the map, that moving the mobile robot from the mobile robot's current position to the floor plan location by driving the mobile robot along a first path will cause the mobile robot to come into contact with one of said stationary and non-stationary obstacles in the physical environment, (iii) generates a second path from the mobile robot's current position to the floor plan location, in accordance with the map, to avoid said contact, and (iv) drives the mobile robot to the actual location represented by the floor plan location using the second path; and c) the robot base controller causes the mobile robot to automatically perform said at least one associated job operation after the mobile robot arrives at the actual location; (d) wherein the set of one or more job operations associated with the specified job location in the map is different from the set of one or more job operations associated with another job location in the map.

~~In one aspect of the present invention, there is provided~~ Also disclosed is a mobile robot for handling a job assignment in a physical environment inhabited by stationary and non-stationary obstacles. The mobile robot generally comprises a robot base that includes a map defining a floor plan for the physical environment, a robot base controller and an onboard navigation system. The job assignment may include a job location defined by the map, a job operation defined by the map, or both a job location and a job operation. The specified job location may have one or more job operations associated with it, which are to be performed automatically by the mobile robot after the mobile arrives at the specified job location. In

response to receiving the job assignment, the robot base controller generates a command signal that causes the onboard navigation system to automatically determine, in accordance with the map, how (as in "what path to use") to get to the place on the floor plan that represents the specified job location. The onboard navigation system then automatically follows the path to the job location required by the job assignment. If the mobile robot encounters a stationary obstacle (such as a closed door or piece of furniture) or a non-stationary obstacle (such as a person, vehicle or other mobile robot), the onboard navigation system automatically calculates a new path to follow to get to the required job location.

The map defines a floor plan corresponding to the physical environment, and also defines a set of job locations in respect to the floor plan. For at least some of the job locations on the floor plan, the map also defines a set of one or more job operations to be performed automatically at that job location. Thus, the map may contain, for example, data defining where a particular job location exists in terms of coordinates delineating the floor plan, as well as certain job operations that should be carried out automatically upon arrival at that particular job location. In response to receiving a job assignment on the robot base controller, the onboard navigation system is activated to use the map, the floor plan and the coordinates in the floor plan to drive the mobile robot to a set of coordinates on the floor plan (i.e., the "floor plan job location") as defined by the map. The floor plan location in the map represents an actual job location in the real-world of the physical environment. So, for example, if the map defines a job location called "pod loading station," which represents an actual pod loading station in the real world of the physical environment, and the map also identifies, in terms of floor plan coordinates, where on the floor plan the "pod loading station" is located, then the onboard navigation system is configured to use the map, the floor plan and the coordinates to drive the

robot comprises a cargo hold, the robot payload may also include a sensor configured to detect when an item is located or securely positioned within the cargo hold.

In another aspect of the present invention, there is provided in a physical environment inhabited by stationary and non-stationary obstacles, a method of handling a job assignment with a mobile robot comprising a robot base and an onboard navigation system, the method comprising: a) storing on the robot base a map defining a floor plan corresponding to the physical environment, a set of job locations in respect to the floor plan, and associating a set of one or more job operations with two or more job locations in the set of job locations; b) receiving the job assignment on the robot base, the job assignment including a specified job location, the specified job location having at least one associated job operation; and c) in response to receiving the job assignment, activating the onboard navigation system to automatically (i) determining a floor plan location based on the specified job location and the map, the floor plan location corresponding to an actual location in the physical environment; (ii) determining, in accordance with the map, that moving the mobile robot from the mobile robot's current position to the floor plan location by driving the mobile robot along a first path will cause the mobile robot to come into contact with one of said stationary and non-stationary obstacles in the physical environment; (iii) generating a second path from the mobile robot's current position to the floor plan location, in accordance with the map, to avoid said contact; and (iv) driving the mobile robot to the actual location represented by the floor plan location using the second path; and d) causing the mobile robot to automatically perform said at least one associated job operation after the mobile robot arrives at the actual job location; e) wherein the set of one or more job operations associated with the specified job location in the map is different from the set of one or more job operations associated with another job location in the map.

Also disclosed is a method of handling a job assignment with a mobile robot in a physical environment inhabited by stationary and non-stationary obstacles, the method comprising the steps of: (1) storing on a robot base a map defining a floor plan corresponding to the physical environment, a set of job locations in respect to the floor plan and a set of job operations associated with one or more of the job locations in the set of job locations; (2) receiving the job assignment on the robot base, the job assignment including a job location defined by the map, a job operation defined by the map, or both; and (3) in response to receiving the job assignment, activating an onboard navigation system on the mobile robot to (a) automatically determine, in accordance with the map, a floor plan location for the job assignment, the floor plan location

representing an actual location in the physical environment, (b) automatically determine that driving the mobile robot to the floor plan location along a first path will cause the mobile robot to come into contact with one or more of the stationary or non-stationary obstacles, (c) automatically generate a second path, in accordance with the map, to avoid the contact; and (d) automatically drive the mobile robot to the actual job location represented by the floor plan location using the second path. The final step of the method comprises causing the mobile robot to carry out a job operation, or a set of job operations, associated with the specified job location by the map. In this aspect, the method may further include the steps of: (4) determining on the onboard navigation system that driving the mobile robot along the second path could cause the mobile robot to come into contact with one of the stationary and non-stationary obstacles, (5) generating a third path, in accordance with the map, to avoid the contact, and (6) driving the mobile robot to the actual job location represented by the floor plan location using the third path.

Embodiments of the present invention have a wide range of practical uses, including but not limited to:

Transporting materials and containers, such as uniformly-sized totes, around a manufacturing facility or distribution center. These environments may involve a lot of other vehicular and pedestrian traffic;

Transporting goods, such as pharmaceuticals and lab samples, between different locations within hospital environments. These environments may also involve a lot of vehicular